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STUDY TOUR 2014: TALA UPAZILA, SATKHIRA

**EFFECTS OF WATER LOGGING ON PEOPLE'S LIFE AND  
LIVELIHOODS IN THE SOUTH WEST REGION OF BANGLADESH:  
A CASE STUDY ON TALA UPAZILA, SATKHIRA**

Master of Science in Disaster Management (MSDM)

By

*Househole Survey Group*

Submitted to

Department of Geography and Environment

Faculty of Earth and Environmental Sciences

University of Dhaka

“A Tour Report submitted to the Department of Geography and Environment under the Faculty of Earth Science, University of Dhaka in Partial Fulfilment of the Requirements for the Degree of Master of Science in Disaster Management (MSDM)”



Dhaka, Bangladesh  
November 2014

## Acknowledgement

We would like to greet our chairman Dr. Md. Abdur Rob, Professor, Department of Geography and Environment for his kind consideration. As well as the MSDM course coordinator professor Dr. A. Q. M. Mahbub for an arrangement of such a nice trip through which we have become experienced and found in the filled of disaster management and we are pretty sure that the knowledge, we have just gathered will take us one step closer to the reality of competitive world.

Our respected teachers guided us through out of the trip and also supervised us fairly in many aspects. Our teachers were dedicated to all of us and this could not have been made without their carrying support. We all are so grateful to them. Teachers whom supervised and accompanied- Dr. A. H. M. Abdul Baquee, Professor; Dr. A. Q. M. Mahbub, Professor; Dr. Md. Humayun Kabir, Associate Professor, Department of Geography and Environment.

We want to thanks the chairman of Jalalpur union parishad, Tala upazila, Satkhira District for his supreme support. We are really grateful to the villagers of Kanaidia, they provided us necessary information. Last of all I repeat, we acknowledge with thanks as well as the contributions of those teachers whom were beside us throughout the tour. We also appreciate the continued guidance and generous assistance of our teachers. I also thanks to my classmates for their great community.

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## List of Acronyms and Abbreviations

BBS	Bangladesh Bureau of Statistics
BCA	Bangladesh Country Almanac
LGED	Local Government and Engineering Department
MS	Master of Science
SPSS	Statistical Package for the Social Sciences

## CHAPTER ONE: INTRODUCTION

### 1.1 Introduction

Water logging problem in the southern part of coastal region of Bangladesh is serious issues (Rahman, 2008). The problem of water logging might be more dangerous than flooding (Chowdhury, 2007). The water logging would affect the biophysical environment and consequently also affect the production of fish and paddy as well as the other socio-economic factors (Alam, 2007). Water logging rotted the roots of trees, and salinity killed off all vegetation, fruit trees died off, agriculture was drastically reduced and even homesteads vegetation and cattle rearing become impossible (Unnayan Onneshan, 2007). Environmental disasters such as water-logging, the silting-up of rivers and salinity have become common occurrences in south western region of Bangladesh and are causing unimaginable suffering for the people (Ashraf-ul-alam, 2005). Permanent water logging has greatly reduced agriculture and related occupations. Stagnant water all over the area leaves no space for disposal of human and other wastes, causing pollution and proliferation of water-borne diseases. Children cannot go to school. Unemployment has led to increase in poverty, outward migration and overcrowding in urban slums, creating new problems (Pasha, 2009).

### 1.2 Background of the problem

The problem could be traced back to the mid 60s when 37 polders and 282 sluice gates were constructed across Khulna, Satkhira and part of Jessore districts (Daily star, 2006) to increase food production by reclaiming saline and swamp areas of coastal belt. After 20 years, the situations totally reverse. The channels are blocked by huge sedimentation. This is caused by low flow of Ganges water due to commissioning Farakka Barrage in upstream (Rahman, 2008). Embankments have created a permanent change in the region (Ashraf-ul -Alam, 2005). Water logging began to plague the area in 1987-88 as riverbeds rose alarmingly due to growing siltation (Daily star, 2006). Already many coastal places, where sustainable drainage network system hasn't developed, are facing water logging problem and the intensity of problem is appearing as a catastrophe day by day (Chowdhury, 2007). This water logging becomes a burden for the inhabitants of southwestern region and creating adverse social, physical, economic and environmental impacts. The water logging poses threat also to the ecology as vegetation, wildlife and livestock face extinction due to the perennial problem (Ashraf-ul -Alam, 2005).

Some vast areas of crop land remained under water for more than 10 years. Many villages were submerged, houses collapsed, transportation systems in those areas ceased. As a result, people have been living on embankments and roads, livestock numbers have greatly decreased, procurement of fire wood and drinking water have become very expensive, education of children has been discontinued and waterborne diseases like diarrhoea and scabies become wide spread, people have great difficulties on finding work and hence the income of the poor people has sharply decreased (Ashraf-ul-Alam, 2005). This region is fully unlivable due to various natural and manmade disasters and its intensity and duration increasing day by days. These disasters are the main causes for the deterioration of natural resources and changes livelihood pattern of indigenous people.

### 1.3 Objectives

The main objective of the field trip is to collect field based data on "Water logging and people's adjustment" at the affected areas of Tala Upzila.

### 1.4 Research Methodology

#### 1.3.1 Data Sources and Methods of Data collection

To fulfill the objective of the study both primary and secondary data were needed. All the necessary data has been collected from various sources and methods. Data sources and methods are discussed below:

### 1.3.2 Primary Data

The primary data source is that type of data sources which provides the primary data. Primary data are collected directly from the field. Different methods were used to collect the primary data from the field are follows:

Figure 1-1: Human Sufferings during Water Logging Situation

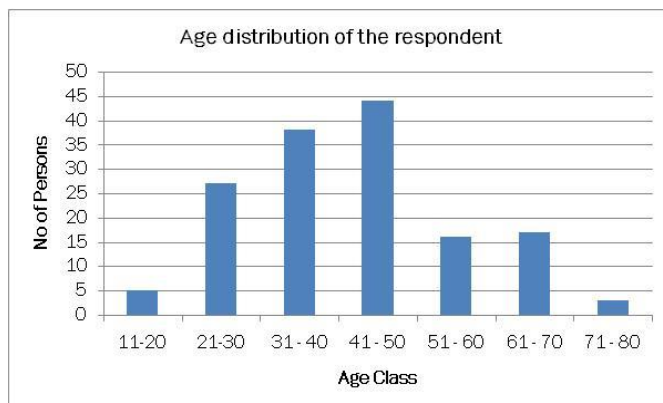


Photo courtesy: Ashroy Foundation, October 2013

#### A. Questionnaire survey

The survey questionnaire was design to collect household socioeconomic information on population characteristics, source of income, occupation, daily livelihoods activities, problems of water logging and adaptation mechanism with water logging. Total 150 households from the village Kanaidia were surveyed during 24 to 26 April 2014. The sample questionnaire is given in Appendices-I. Different age group, sex, religion was considered during field survey.

Figure 1-2: Age distribution of the Respondent



Source: Field Survey, April 2014

Figure 1-3: Questionnaire Survey during Field Visit



Source: Questionnaire Survey, April 2014



### **B. Participatory observation**

Field survey is very important for geographical study, which helps to ground truthing and make it easier to verify the real state of the study area. During participatory observation time necessary steps like looking, listening and writing were following to collect valuable information. Two days (from 24 to 26 April 2014) were spent to collect primary data from the study area. The study area were physically observe to know about the present status of water logging problems, problems they are facing in different time, their coping strategy, formal and informal initiatives and their effectiveness and overall conditions of the study area.

### **C. Collection of Photographs**

A photograph is worth a thousand words. Photographs represent many expressions which are not possible in word. Some of these photographs have been collected directly from field survey and some other from daily news papers as well as from internet websites.

## **1.3.3 Secondary Data**

Secondary data were collected from different sources and methods according to needs. Data and information were collected from BBS, BCA database, LGED database, Google earth images, search from Internet and previous research reports.

### **A. News paper**

Various study relevant information, data, and case studies were studied and compiled. Both Bengali and English daily newspapers were studied for seeking information and data.

### **B. Internet sources**

Research relevant information, photograph and data on water logging in south western part of Bangladesh were collected from internet then compiled and analyzed for this research. Internet sources include research paper, articles, reports, workshop outputs, and information published in the web sites.

## **1.3.4 Technique of Analysis and Presentation of Data**

### **A. Statistical analysis**

After collecting primary data from the field, it was necessary to analysis and processing for representation of data in the final research output. SPSS and MS-Excel program was used to process all collected information using computer. Responses of the completed questionnaires were numerically coded and analyzed. In addition, graphs and tables were used to interpret the findings.

### **B. Numerical and Graphical presentation**

Data presentation is also an important step in a research work because without this all data is valueless. Numeral presentations were made to represent the collected data because it helps to realize the main idea. Finally the analyzed data have been integrated and presented as maps, tables and graphs in the report.

## **1.5 Chapter Organizations**

In the Study Tour Report, there are four chapters in the report starting with this Introductory Chapter. In Chapter 2, discuss about the detailed of the study area including physical and socio-economic characteristics. In Chapter 3, discuss about the causes of water logging, present status of water logging, various vulnerable issues and effects on various sectors. In Chapter 4, and summary and conclusions are presented.

## **1.6 Limitations of the Study**

Due to time constrains it was not possible to conduct a detailed or baseline study for understanding the exact condition of the Tala Upzila in Satkhira District. It was a course work under the MS programme in Disaster Management, Department of Geography and Environment, University of Dhaka. As a part of the course the main objectives of the study was conduct hands on practice for the students to collect various information and data following appropriate methods and techniques for conducting a research work.

## CHAPTER TWO: PROFILE OF THE STUDY AREA AND RESPONDENTS

### 2.1 Introduction

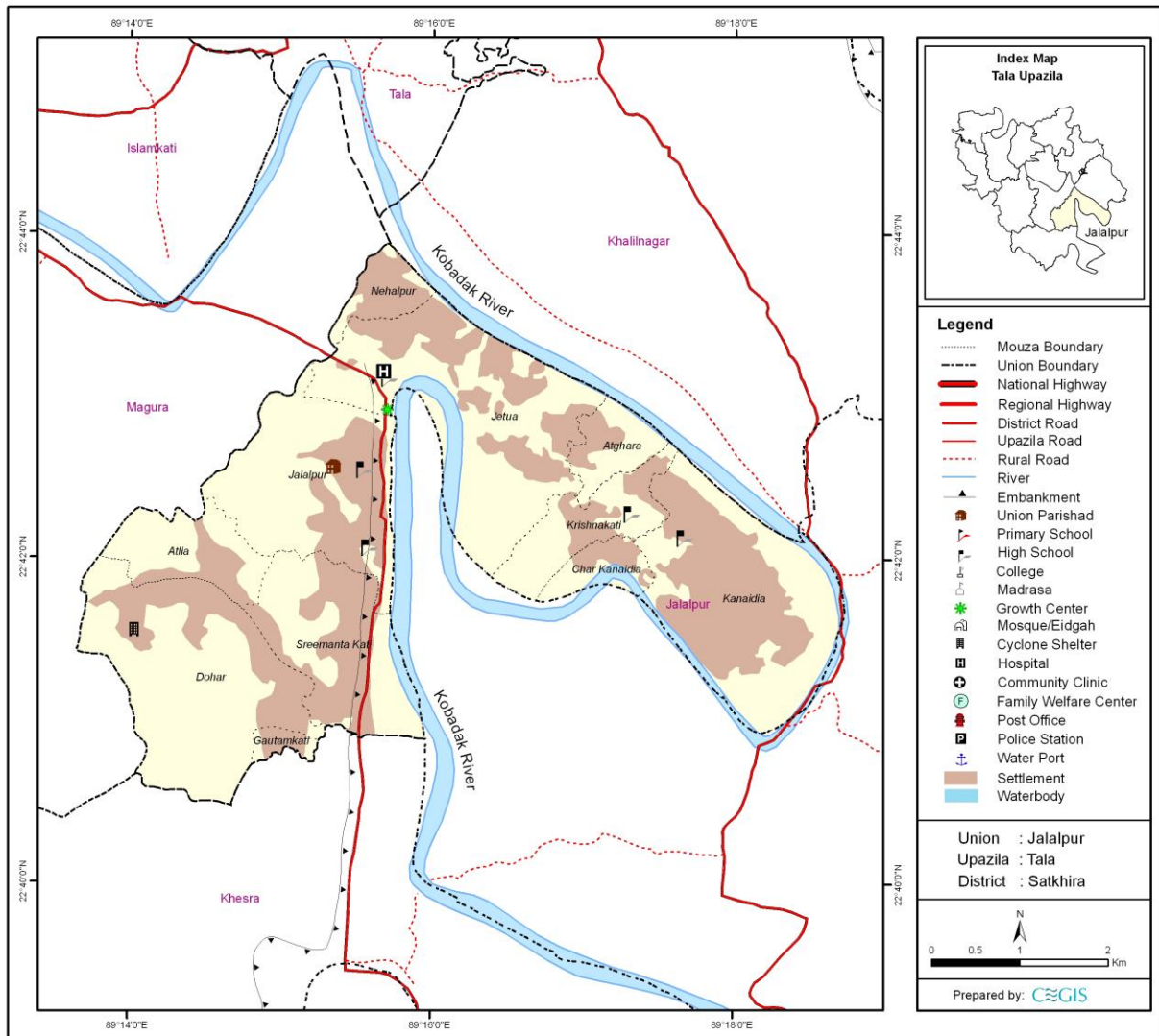
Tala came into existence in 1913 as Thana and was upgraded to upazila in 1989. There are different views about the origin of the upazila name. The popular view is that in the long past a fisherman got a big chest with a strange Lock meaning Tala and took it to the present place of the upazila. It is believed that the name of the upazila might have originated from the above word Tala.

The upazila occupies an area of 337.24 sq. km. It is located between 22° 32' and 22° 50' north latitudes and between 89° 05' and 89° 20' east longitudes. The upazila is bounded on the north by Keshabpur upazila of Jessore zila and Kalaroa upazila, on the east by Dumuria and Paikgachha upazilas of Khulna zila, on the south by Assasuni upazila and on the west by Satkhira Sadar upazila.

### 2.2 Selection of the Study Area/ Background of the study area

Because of various constraints imposed by time and money available, the field survey study was conducted in a small area like: Kanaidia village under Jalalpur Union, Tala Upazila in Satkhira district.

Map 2-1: Study Area



Source: CEGIS

## 2.3 Location and Area

The total area of the Jalalpur Union is about 5923 (Acres). Total Households in the union is 5413 and in the Kanaidia village is about 1031. Population density of the union is 991 [sq. km] (BBS 2012).

Jalalpur union, Tala, Satkhira at a glance<sup>1</sup>:

1. **Area in Acres:** 5923
2. **Location:**
  - A. Relative location: East: Khalilnagar union, West: Magura union, North: Islamkati union, South: Khesra union.
  - B. Absolute location: 22° 45' N, 89° 15' E to 22° 70' N, 89° 26' E.
3. **Population Characteristics:**
  - A. Total population: 21699 (Male: 10778, Female: 10921, Sex Ratio: 99)
  - B. Population density [sq. km]: 991
  - C. Total Households: 5413
  - D. Average size of Household: 4.0
  - E. Literacy Rate (%): 50.6 (Male 54.8, Female 46.5)
  - F. Religion: Muslim 16581, Hindu 4953, Christian 164, Buddhist 1
  - G. Type of disability (%): All 2.1, Speech 0.2, Vision 0.7, Hearing 0.2, Physical 0.7, Mental 0.2, Autism 0.1
  - H. Employment Status: Employed: Male 1622, Female 113; Looking for work: Male 3, Female 6; Household work: Male 23, Female 2326; Do not work: Male 243, Female 510
  - I. Field of Activity: Agriculture: Male 1501, Female 79; Industry: Male 25, Female 0; Service: Male 96, Female 34
4. **Water, sanitation, hygiene facilities:**
  - A. Toilet Facility (%): Sanitary (water-sealed) 1.8, Sanitary (non water-sealed) 56.8, Non-sanitary 38.1, None 3.3
  - B. Source of Drinking Water (%): Tap 0.4, Tube-Well 95.7, Other 3.9
  - C. Electricity Connection (%): 40.8
5. **Others institutions<sup>2</sup>**

There are about 11 Mouza and 13 villages are located in the Jalalpur union. Others institutions are: high school 5, primary school 15, madrasa 10, no college, hat/bazaar 4, health and family centre 1, community clinic 3, post office 3.

## 2.4 Physical setting of the study area

### 2.4.1 Physiography of the Area

The study area located western part of Ganges river floodplain, which is predominately highland and medium highland. The deposits are predominantly silts and clays, but sand occurs in places. The young alluvium is moderately alkaline in reaction, but it is neither saline nor sodic.

**Ganges flood plain:** The Ganges flood plain is basically consisted of the active floodplain of the Ganges River and the adjoining meandering floodplains. In the southern part of the Ganges floodplain, the tide water feed some rivers only during the spring tide. The tide difference is less than 1 meter. Sediments are silt, sandy silt and clayey silt. Along the rivers, sediments are sandy in nature.

**Gopalganj/Khulna peat lands:** The zone occupies a number of low-lying areas between the Ganges river floodplain. The soil, in this zone, is potentially strongly acidic and low in essential plant nutrients. Water and soil are saline to slightly saline in nature and salinity level controlled by fresh water flow from the upstream and rainfall.

<sup>1</sup> Community Report, Satkhira Zila, Population and Housing Census 2011, BBS, 2012

<sup>2</sup> <http://jalalpurup11.satkhira.gov.bd/node/61926>

## 2.4.2 Geology

The area surfaced by alluvial and paludal deposits. Alluvial deposits are tidal deltaic deposits and deltaic silt deposits. Paludal deposits are marsh clay and peat deposits (Alam et. al., 1990).

**Tidal deltaic deposits:** Sediments mainly composed of clay, silty clay and silt. Sediments are light grey to greenish grey in color. In places, it weathered into yellowish grey color.

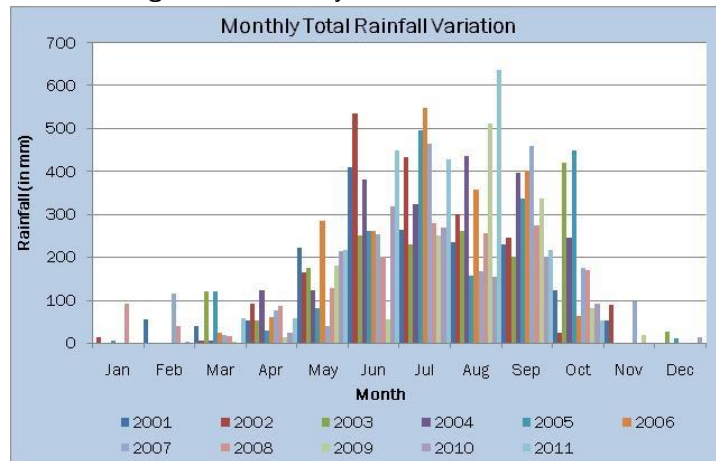
**Deltaic silt deposits:** Sediments are silt, clayey silt and silt. Silt and clayey silt are dusky yellow in color. Normally, there is alternation of silty clay and clayey silt with fine to very fine sand. Along the natural levees, sediments are fine to very fine sand with silt and sandy silt.

**Marsh clay and peat deposits:** Paludal deposits, clay is grey to bluish grey in color. Subsidence is greater in the peat areas. This subsidence is not only due to the tectonic reason but also due to shrinkage of top of the peat layers and oxidation of carbonaceous matters (Eggesmann, 1982).

## 2.4.3 Climate

Mean annual rainfall is 1632 mm. The average dry and wet seasonal rainfall is 193 mm and 1517 mm respectively. The mean annual maximum temperature is 31.32 °C and the minimum is 21.40 °C. In dry season the mean maximum temperature is 30.62 °C and in wet season the mean maximum temperature is 32.28 °C. In dry season the mean minimum temperature is 18.49 °C and in wet season the mean minimum temperature is 25.48 °C.

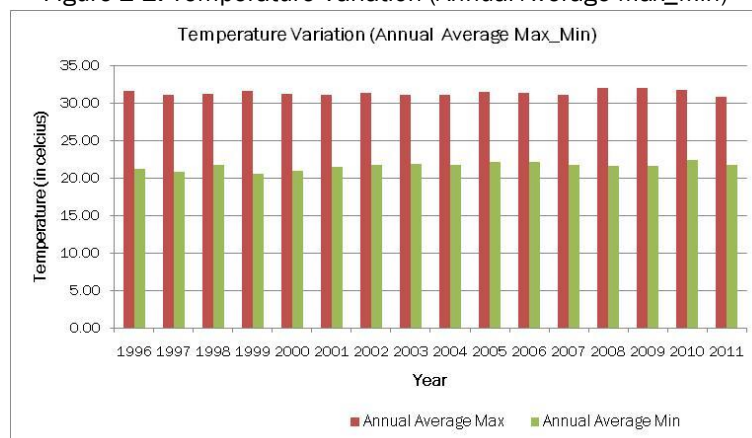
Figure 2-1: Monthly Total Rainfall Variation



Source: BMD

The annual average wind speed is 174.57 km/day. The average dry and wet seasonal wind speed is 177.41 km/day and 170.75 km/day respectively. The annual average sunshine hour is 6.79. The dry and wet seasonal average sunshine hour is 8.04 and 4.97 respectively. The average annual humidity is 74.70 %. The dry and wet seasonal average humidity is 68.97 % and 82.78 % respectively.

Figure 2-2: Temperature Variation (Annual Average Max\_Min)



Source: BMD

#### 2.4.4 Flora and Fauna

This floodplain is characterized by mixed vegetation. Presence of a lot of stagnant water bodies and channels, rivers and tributaries in this zone support a habitat of rich biodiversity to some extent. In the beels and other water bodies, free-floating aquatic vegetation is prominent. Homestead forests, on the other hand, include both cultivated and wild plant species. Main fruits are aam (mango), jaam (blackberry), kathal (jackfruit), kola (banana), pepe (papaya), lichoo (litchi), naarikeel (coconut) and peyara (guava).

#### 2.4.5 Soil

The important characteristics of the soils in the study area reveals that soil texture vary from silty loam to clay loam. Soils in this area exhibit calcareous dark grey flood plain soils. Organic matter contents are 1-2 percent in the cultivated layer. Permeability is moderate, but may be impended where topsoils are puddle for paddy cultivation. Soil Ph ranges from 5.5 to 8.4. Moisture holding capacity is moderate or good (FAO, 1988).

#### 2.4.6 Drainage

The area is mainly drained by a number of north-south flowing rivers. The main rivers are the Kopotakhi river across Dorgapur union of Assasuni Upazila, Kholpotua River, Betna River, Raimangal River, Hariabhanga river, Ichamti river, Betrabati River and Kalindi-Jamuna River.

Most of the rivers are tidal in nature. In the rainy season, water becomes fresh to slightly salty and in the dry season, it becomes salty. Most of the river waters carry appreciable amounts of suspended sediments (Reshad et. al., 2001).

#### 2.4.7 Land Use

Development of agricultural land of any place depends on the climate, Physiography, soil, availability and quality of surface water of that place. Basically the land in the study area is plain land. And two types of land use are present, one is agricultural purposes (boro paddy etc) another is non agricultural purposes (settlement, institutions, road, garden, graveyard etc).

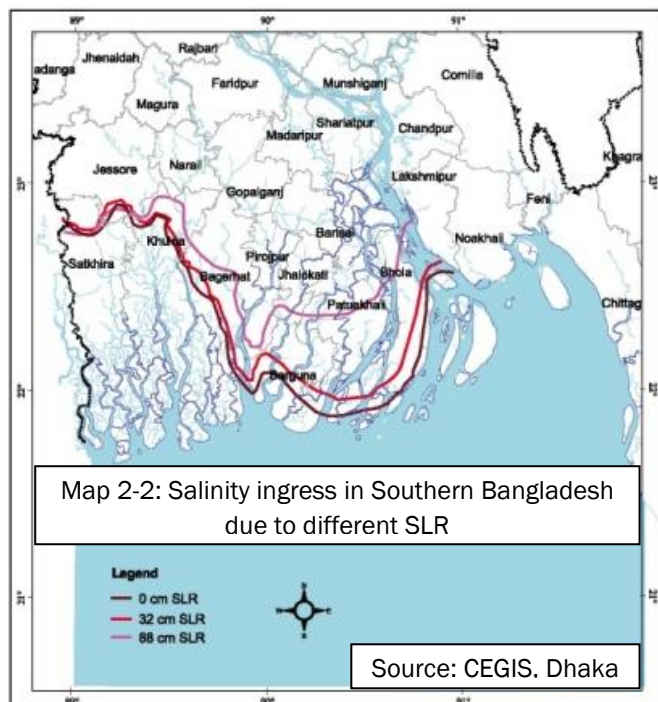
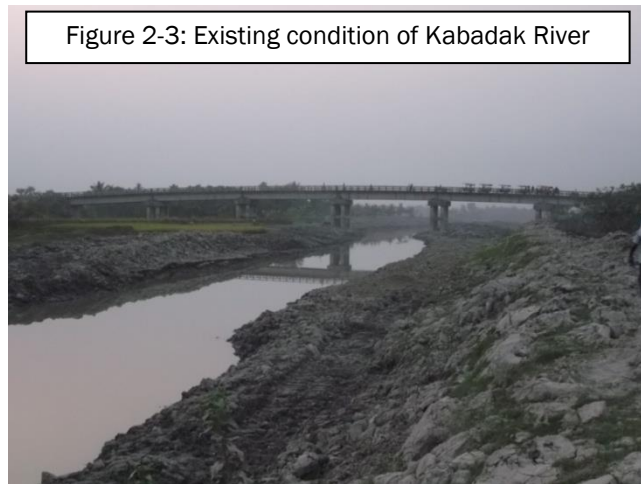
**Highland and Medium Highland:** Basically high land is using as settlement area, transportation system, various infrastructures, garden etc.

**Medium Lowland:** In some areas, boro paddy is preceded by mustard early in the dry season. Here irrigation is necessary to cultivate boro paddy.

**Lowland:** With irrigation, boro paddy (mainly HYVs); usually fallow in the kharif season. Such types of land are also using as the fishing ground.

**Very Lowland and Bottomland:** usually traditional, early-maturing, varieties of boro paddy, often with supplementary irrigation. Some areas remain under reed swamp or permanent water bodies (beels/khal) using as the fishing ground.

Figure 2-3: Existing condition of Kabadak River



### 2.4.9 Salinity

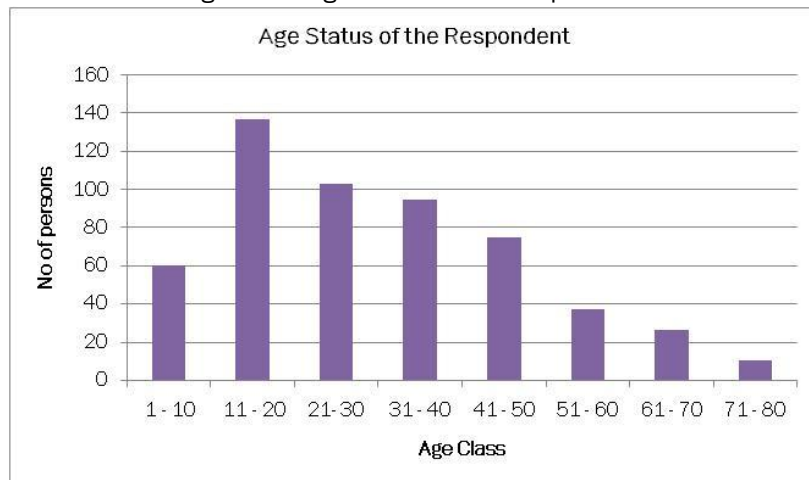
The water and the soil are saline but in the rainy season salinity becomes low. Fresh water flows from the upstream regions and the tides normally control the salinity of this region. The major portion of the floodplain is low-lying, barely one meter above mean sea level and below high tide level. Homesteads, roads, vegetable gardens and orchards were developed on areas artificially raised by digging ponds and ditches.

## 2.5 Socio-Economic characteristics of the area

### 2.5.1 Respondents' Demographic Profile

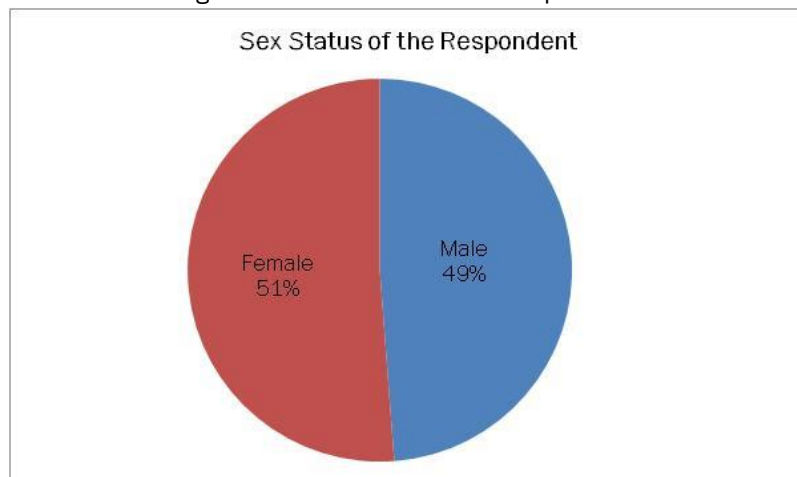
During field study total surveyed household was 150 and total population was 543 in the Kanaidia village. Among the surveyed household most of the people age ranges between 11 to 50. Age ranges between 11 to 20 total no of population is 137, from 21 to 30 is 103, 31 to 40 is 95 and 41 to 50 is 75.

Figure 2-4: Age Status of the Respondent



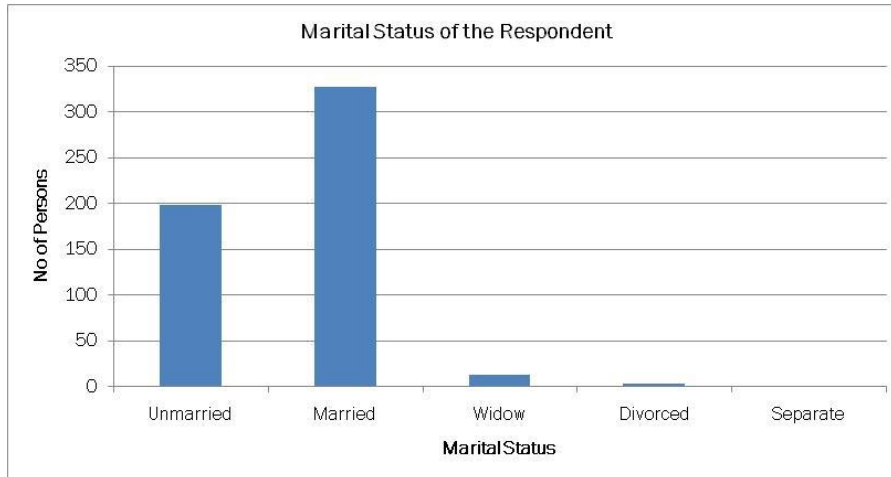
In the surveyed community male population was 49% and female population was 51%. As a result more the people live in the household and engaged themselves with the household work.

Figure 2-5: Sex Status of the Respondent



Among the surveyed households total married persons was about 327 (60%) and unmarried population was 199 (37%), 13 (2%) widow and 4 (1%) divorced persons. In Kanaidia village growing population is more comparatively other age group. Highest number of population about 137 is ranges between 11 to 20. Most of this aged group people are unemployed and work as students or engage themselves with the household works. There is a tendency to marriage their son and daughters to near by areas, its may be in the same village or same union or same upazila.

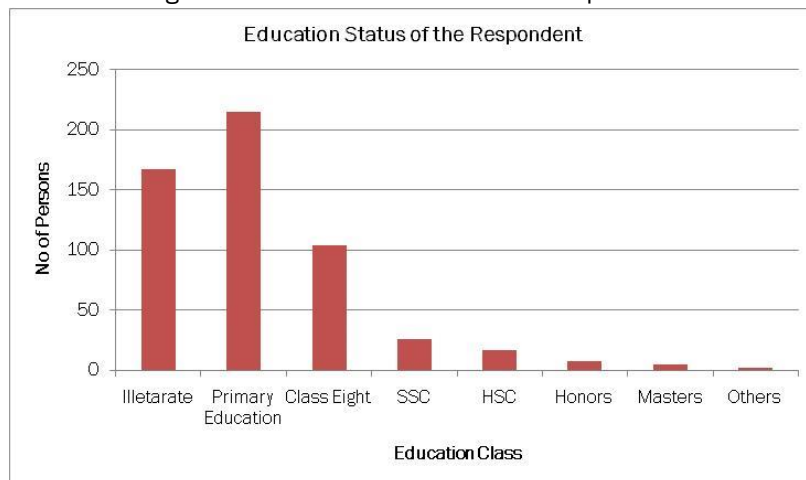
Figure 2-6: Marital Status of the Respondent



### 2.5.2 Educational Background

There are lacking of educational institutes and communication infrastructure. During the water logging situation the young people can not go to school due to lack of communication network, also social security problem. Sometimes parents feel uneasy to send their children to the school. At that time school building also used as a temporary shelter. Among the surveyed people 31% people is illiterate, 40% completed primary education, 19% completed up to class eight and 5% completed SSC exam.

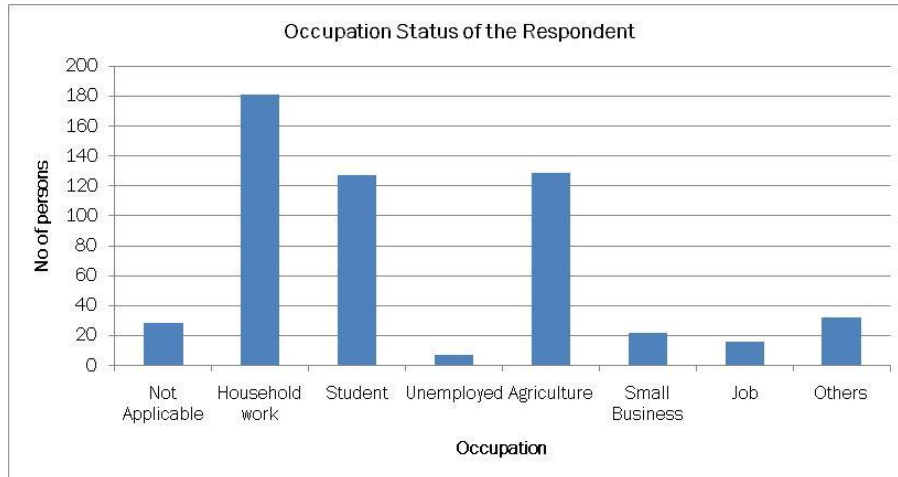
Figure 2-7: Education Status of the Respondent



### 2.5.3 Occupational Status

In Kanaidia village there are lacking of industrialization process as a result most of the people are engaged with primary activities like: agricultural activities, household work, day labour etc. Few numbers of people are engaged with small business and job. Dependant population is about 29%, Unemployed persons are 7%, highest number of population about 33.33% are engaged with household work, then agriculture & students are respectively 24% & 23%.

Figure 2-8: Occupation Status of the Respondent



#### 2.5.4 Income and Economic Activities

Rich man or Powerful muscleman engaged with pisciculture, locally called gher. Main income sources of the community in the Kanaidia village are Agricultural production, Day labour, Agricultural labour, Household work etc. Some households also sell their household products for major income like: Chicken, Coconut, Mango, vegetables etc.

Most of the people depend on primary economic activities. The main exports are shrimp, paddy, jute and jute goods. Main Crops are: Paddy, jute, sugarcane, mustard seed, potato, onion and betel leaf. Extinct or nearly extinct crops are linseed, sesame, kaun and Aus paddy.

Figure 2-9: Agricultural Activities (Picture 1 &amp; 2)



#### 2.6 Conclusions

The south west region is uniquely different from the other regions in our country. This area is rich in ecosystem and biodiversity but now a day this ecosystems and biodiversity are becoming extinct because of the nature and ill planned activities of man. It has a great impact on our natural environment. The livelihoods and land use activities of the study area have changed significantly due to water logging and climate changes over the time.



## CHAPTER THREE: IMPACTS OF WATER LOGGING

### 3.1 Introduction

Satkhira region is one of the most disaster prone areas in Bangladesh. The people of this area have been facing consecutive hazards and disasters for different reasons. Due to siltation of Kapatakshma River and incessant rainfall has created water logging situation. Extreme downpour and incessant raining create an extreme and extensive high inhumanities situation over the areas.

### 3.2 Causes of water logging

KJDRP design had ignored the special geo-characteristics of the region. The ecological features of the project area had not been considered. The aquatic life cycles had been neglected and organic production and biodiversity have been ignored.

There are two types of waterlogged areas, anthropogenic waterlogged areas and natural waterlogged area. Natural waterlogged areas are historic water pockets, the wet lands of this region. Anthropogenic waterlogged areas are the water pockets that formed mainly due to human activities (poldering) together with other factors. Here, problems are due to unperfected permanent or seasonal water congestion. It is hampering the normal land-use, ecology, morphodynamics, economical activities and normal activities of life of the area.

- Construction of ill planned polders
- Decrease of upland flows
- Construction of Farakka Barrage
- Construction of permanent polders and their mismanagement
- Population growth and unplanned development
- Siltation in riverbed
- Topography
- Use of land and water by influential group
- Lack of public awareness and education
- Political Interest
- Economic Interest

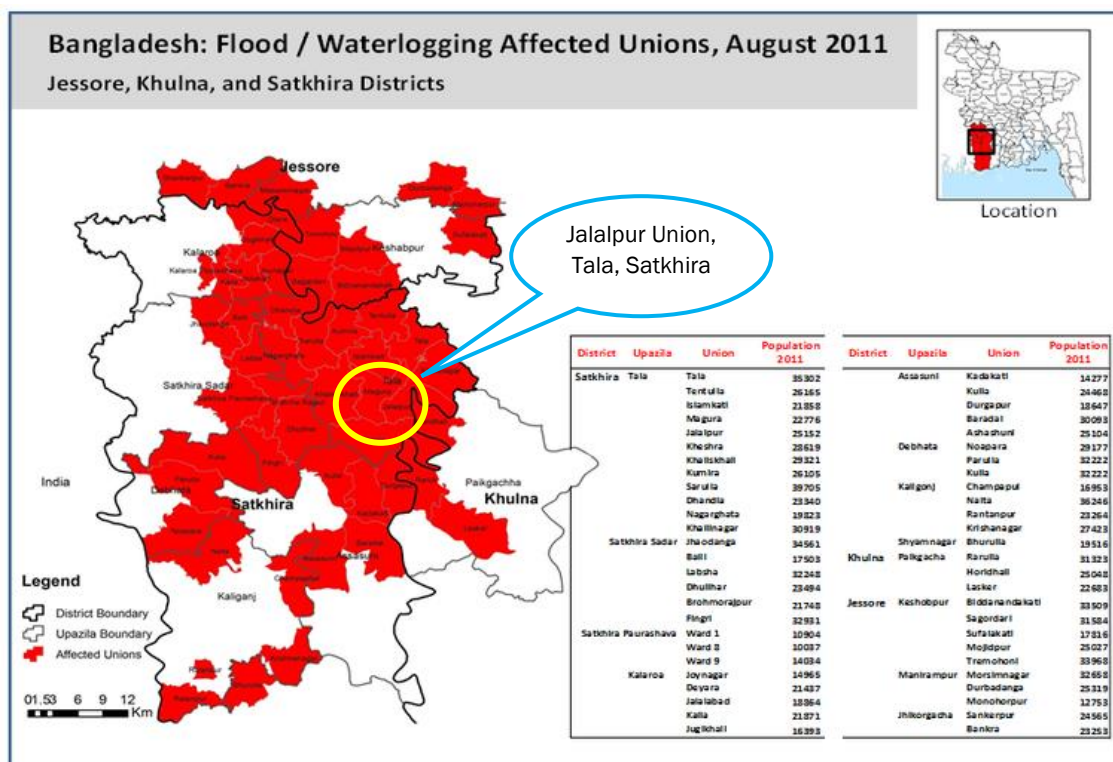
### 3.3 Present status of water logging

Table 3-1: Specific Information of Affected Area (Most Affected)

District	Satkhira
Upazilla	Tala
Union	Jalalpur
No. of Village most affected	05
Total affected HHs	1200
No. of affected HHs took shelters outside home	500
No. of house damage	100
No. of HHs have available stocks of food (for 7 days)	300
No. of HHs have access to safe drinking water	400
	(other collect from average 3-5 km distant sources)
No. of HHs have access to safe latrine	200
No. of People fallen sick	80
Damage of public infrastructure	Roads: 15; Bridge: N/A; Culverts: 20; PSF: N/A; TW: 300
Supports provided	Community:....; Govt: 8.5 Ton; Partners:....;Other NGOs:....; Donors:...

Source: Ashroy Foundation 2013

Map 3-1: Severe Water logged area in south-western Bangladesh in 2011



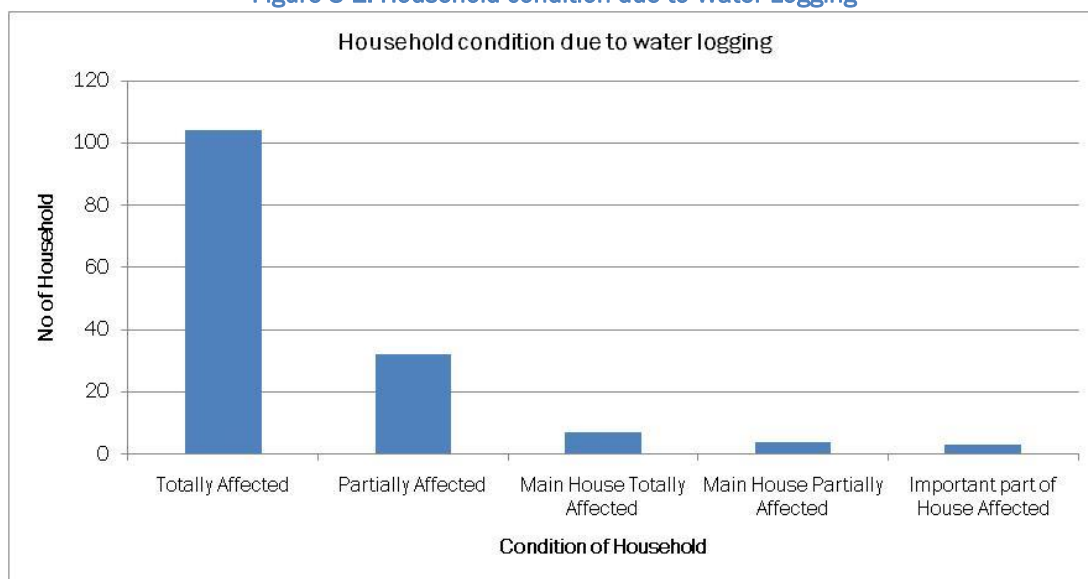
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### 3.4 Impacts of Water logging on Socio-economic and Environmental condition

#### 3.4.1 Household condition

Most of the mud made houses were collapsed due to incessant heavy downpour. These are not anymore suitable for living. Some people moved to safe places for living. Most of the displaced people live under open sky in inhuman way. Most of the mud made houses were damaged completely and also damaged partially.

Figure 3-1: Household condition due to Water Logging

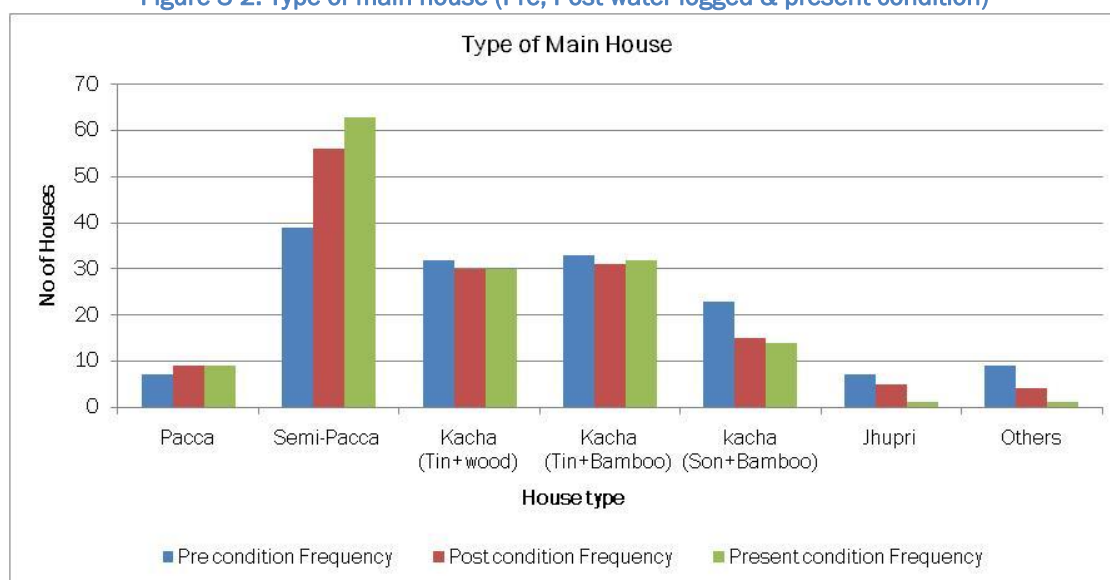


About 69% household were totally affected during waterlogging, 21% were partially affected, 5% main house totally affected and 3% were main house partially affected. The following Table 3-2 showing the number of main house and Figure 3-2 showing the type of main house in the waterlogged affected area.

Table 3-2: Number of main house (Pre, Post water logged & present condition)

Pre condition			Post condition		Present condition	
No of House	Frequency	Total House	Frequency	Total House	Frequency	Total House
1	101	101	109	109	105	105
2	31	62	27	54	32	64
3	13	39	12	36	10	30
4	4	16	1	4	2	8
5	1	5	1	5	1	5
Total house		223		208		212
No of Household		150		150		150
Average house		1.49		1.39		1.41

Figure 3-2: Type of main house (Pre, Post water logged & present condition)



Before waterlogging situation most of the houses were kacca but at the present houses are mostly semi pacca because of their learning lessons from the previous waterlogging. Now the communities people are tend to construct semi-pacca houses to cope with the waterlogging condition. The size of main houses and value/cost of main houses are shone respectively in Table 3-3 and Table 3-4.

Table 3-3: Size of main house (Pre, Post water logged & present condition) (sq feet)

House size	Pre condition	Post condition	Present condition
Total size	27091	27504	28381
Total household	150	150	150
Average	180.61	183.36	189.21

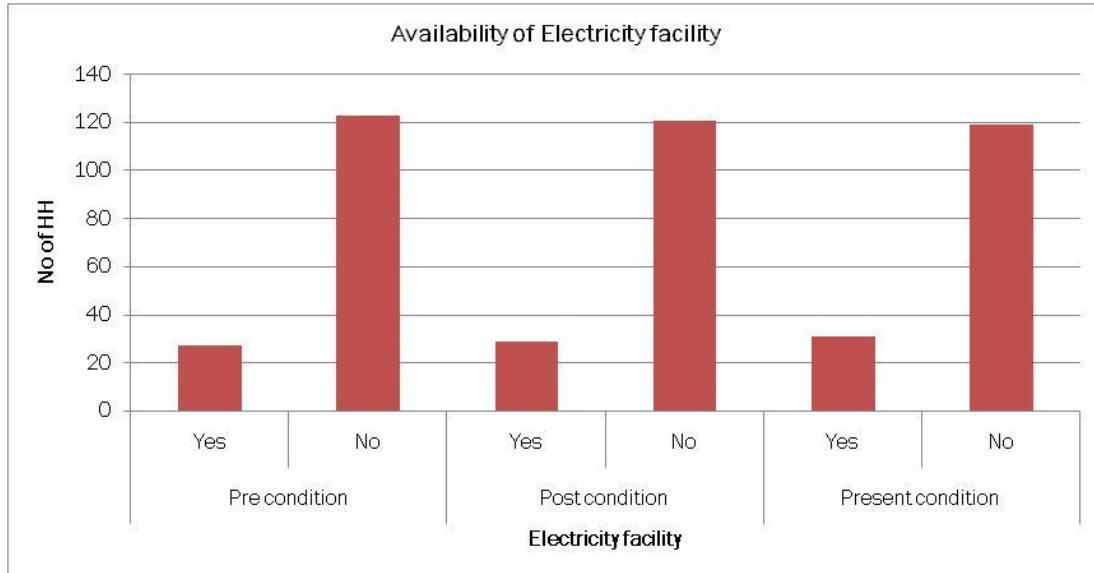
Table 3-4: Value/cost of main House

Household cost	Pre condition	Post condition	Present condition
Total Value	6827165	7414275	9715030
Total household	150	150	150
Average	45514	49429	64767

### 3.4.2 Availability of Electricity facility

Day by day's availability of electricity facilities are increasing. During waterlogging precondition period electricity facilities were only 27 households. During post condition and present condition there have respectively 29 and 31.

Figure 3-3: Availability of Electricity facility



### 3.4.3 Availability of Toilet facility

During waterlogging time most in affected toilets are filled with dirty water or even submerged and damaged, washed away and flooded. Polluted sanitation made the environment unhygienic & spread out germs awfully. Gradually, water borne diseases spreads out. In present condition availability of toilet facilities are increasing Table 3-5 and people are intending to use hygienic toilets.

Table 3-5: Availability of Toilet Facilities

	Pre condition	Post condition	Present condition
	Frequency	Frequency	Frequency
No opportunity	8	9	1
Unhealthy	100	107	86
Healthy	39	30	62
Others	3	4	1
Total	150	150	150

### 3.4.4 Living place during water logging

Some people take shelter on mainly high embankment in polythene made hut, or small temporary sheds, educational institutions and some also left their living places and went nearby relative houses places. It is found that most of the displaced people are living with their livestock in such type of small hut or temporary shed.

Table 3-6: Coping strategy during waterlogging

Living place	Frequency
Own house by hard work	32
Relatives house	39
Others	79
Total	150

Table 3-7: Living place during water logging

	Frequency
Boilar mor	13
Pacca Road	28
wapda road	9
Embankment	14
Neighbour,s home	3
Rental Home at Satkhira	3
Migrate to Jessore	1
Roof of school bulding	1
Rothkhola Bazar	5
Temporary shelter	2
Total	79

According to the field survey it is found that about 70% of the houses were affected by water during water logging. As a result people took shelter to the road and many of them were going to their relatives houses in Khulna or nearby regions. After the period of severe situation most of the houses were built again because previous houses were damaged harshly. Survey result shows that 87% of the houses were fully water logged and people took shelter to other places where 13% of the houses are partially affected. That water logged condition remains about 6 months because of poor drainage condition.

### 3.4.5 Household Reconstruction mechanism

Affected houses were reconstructed by their won cost and by the help of NGO and Government support. Reconstruction cost were provided by mainly UK based Solidarity Worldwide. 45 % household were served by foreign organization, partially support from government sector, local authority, and 21 % were done by own expense. Some of the people took loan from the bank for this purpose. Reconstruction of Household, Source of capital for reconstruction of houses, Legibility of constructed house and Satisfaction level for constructed houses are shown respectively in Table 3-8, Table 3-9, Table 3-10 and Table 3-11.

Table 3-8: Reconstruction of Household

	Frequency
Full support from foreign organization	67
Partially support	43
Own expense	31
Others	9
Total	150

Table 3-9: Source of capital for reconstruction of houses

	Frequency
By savings	22
Bank loan	1
loan from relatives	7
Land sell	1
Ngo loan	24
Others	14
Not Applicable	81
Total	150

Table 3-10: Legibility of constructed house

Type	Frequency
More durable	29
Moderate durable	95
Not durable	23
Vulnerable	3
Total	150

Table 3-11: Satisfaction level for constructed houses

	Frequency
Fully satisfied	48
Partially	94
Not at all	8
Total	150

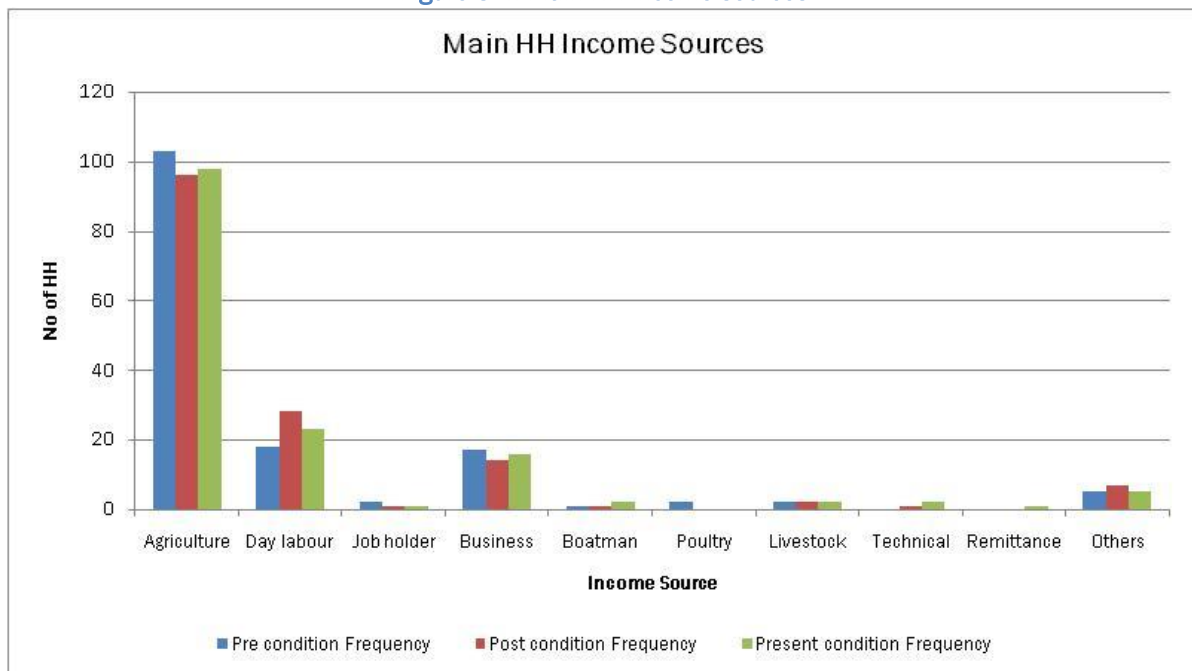
### 3.4.6 Income and expense in the study area

Total numbers of employed persons are gradually increasing. For increasing their household income people are engaging themselves with the primary as well as secondary activities. Some people are tend to migrate in local urban area for business purposes.

Table 3-12: Earning persons

	Pre condition	Post condition	Present condition
	Frequency	Frequency	Frequency
Total No of Persons	183	181	191
Total HH	150	150	150
Average Earning persons	1.22	1.21	1.27

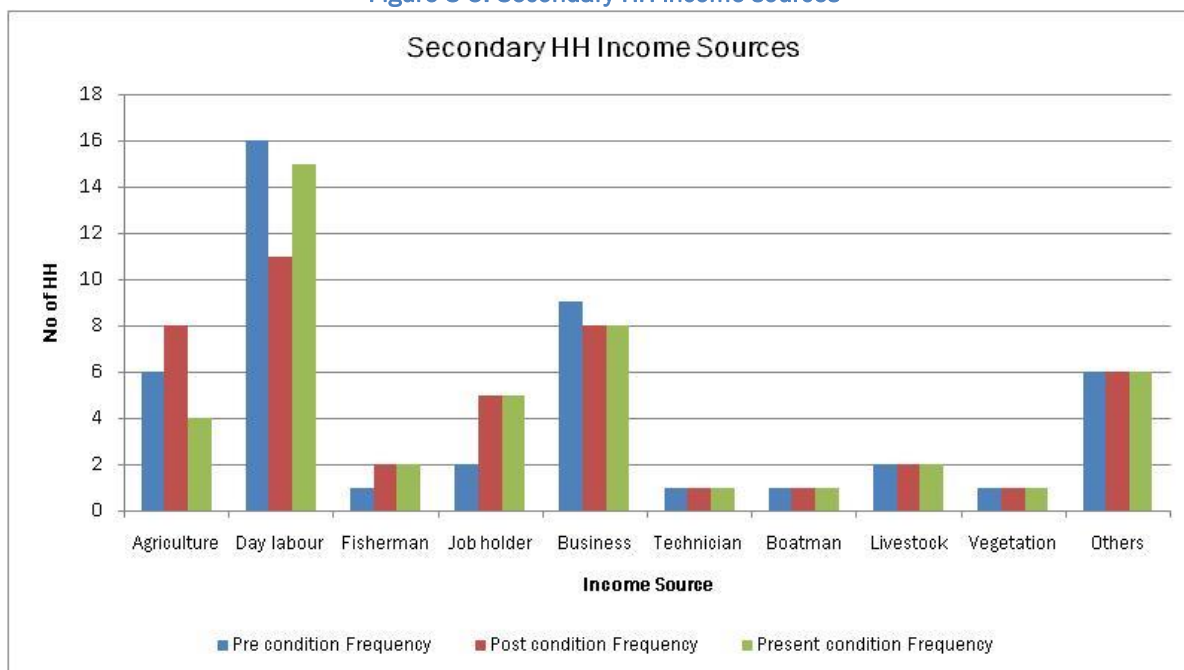
Figure 3-4: Main HH income sources



The main usual sources of income reported by the male community groups were agriculture, Day Labour and Business Man. All of these have been significantly affected by the water-logging with resumption of normal activities. Communities reported that most people now are without any livelihood at all. There is

very little work available in Agriculture and fisheries because these areas have been so significantly affected by the water-logging.

Figure 3-5: Secondary HH income sources



As the income source and belongings were washed away, the earning members of the families becomes jobless. The marginal farmers, poor, lower income households and others who are mainly dependent on wage/daily labor is the worst victim of waterlogging.

Table 3-13: Household Monthly and Average income

Income Range	Pre condition	Post condition	Present condition
	Frequency	Frequency	Frequency
Below 5000	104	115	99
5001 to 10000	33	28	45
10001 to 20000	12	6	5
20001 to 30000	0	0	0
30001 to 40000	1	1	0
40001 to 50000	0	0	0
Above 50000	0	0	1
No of HH	150	150	150
Total Income	834100	736200	828700
Average Income/HH	5560.67	4908.00	5524.67

Community said us displacement rate is very high in this area. People who are displaced do not have any regular income and rely on income derived from the sale of assets. Communities reported that most people now are without any livelihood at all. There is very little work available in shrimp cultivation, agriculture and fisheries because these areas have been so significantly affected by the water-logging.

Table 3-14: Household Monthly and Average expense

Expense Range	Pre condition	Post condition	Present condition
	Frequency	Frequency	Frequency
Below 5000	102	104	96

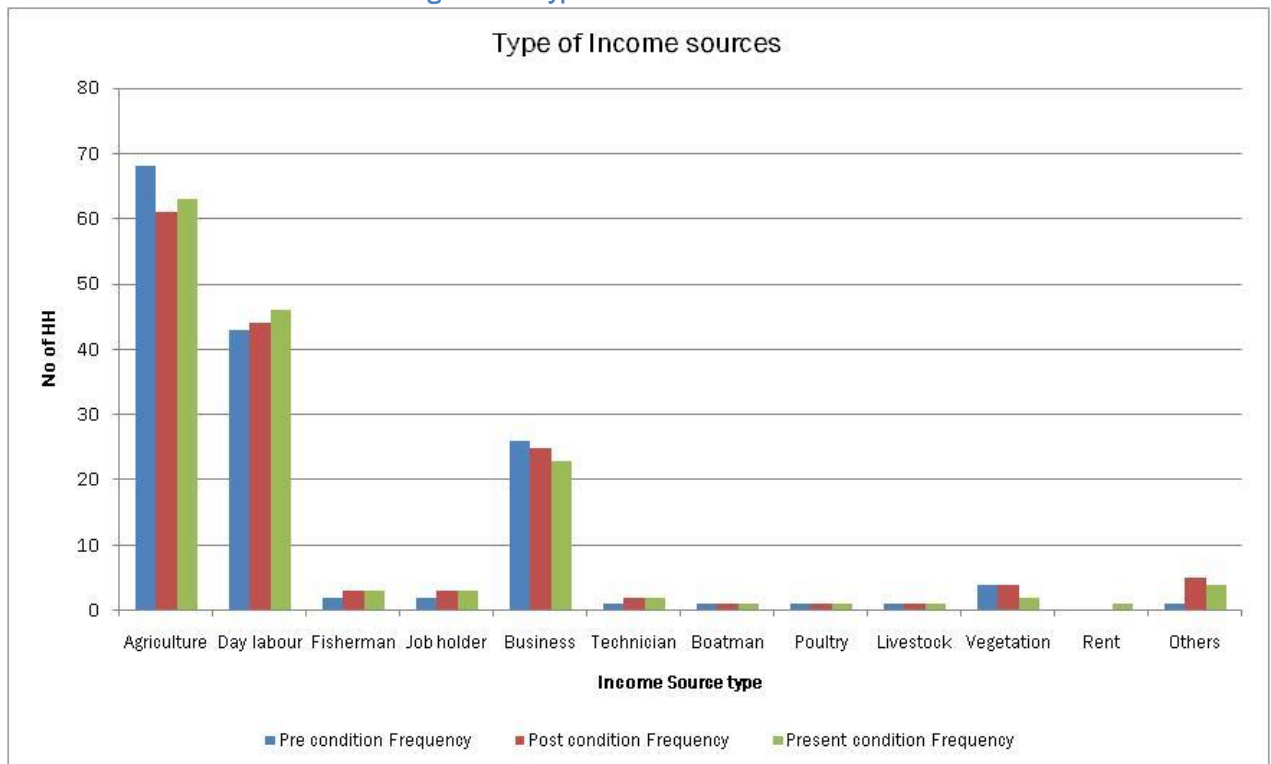
5001 to 10000	38	38	44
10001 to 20000	10	6	10
20001 to 30000	0	1	0
30001 to 40000	0	1	0
40001 to 50000	0	0	0
Above 50000	0	0	0
No of HH	150	150	150
Total Expense	794400	801300	815900
Average Expense/HH	5296.00	5342.00	5439.33

The above Table 3-14 shows that Pre, during and post waterlogging expense of the household. In this indicate that before waterlogging more than 100 people monthly expense below 5000 tk. On the other hand monthly expense 10000 to 20000 there rate is very low. Actually most of the people in this area are farmer when land is inundated by the water they loss crop land. They did business and fishing. During the flood time they also affected by the water.

Table 3-15: Number of Income Sources

Source of income	Pre condition Frequency	Post condition Frequency	Present condition Frequency
1	117	117	115
2	31	30	29
3	1	2	5
4	0	0	0
5	1	1	1
Total Income source	187	188	193
Total Family	150	150	150
Average Income source	1.25	1.25	1.29

Figure 3-6: Type of Income sources





Agriculture is the main income source in this union. As per the community consultation Jalalpur union normally produces significant quantities of T. Aman, Boro rice, winter vegetables and cash crops including betel leaf, oilseeds, jute and sugar cane. The current water-logging has damaged transplanted Aman (monsoon-rice crops), and resulted in an inability to plant a 2013/2014 boro rice crop properly. In the waterlogged areas, the majority of farmers growing T.Aman rice have lost their crops because it was in mid-growth stage. Various organizations are working in affected areas report that due to income opportunities being decreased negative coping strategies are already being deployed, including selling productive assets, out migration of male labor and taking out loans. But present condition in this area people are take lone from the NGOs.

### 3.4.7 Money saving and loan status

According to the bar chart pre waterlogging more than 120 people do not saving money. But situation in the present condition 140 people saved money. People are less interested to save money. During waterlogging situation community spent more money from their savings and the rate of loan taking are increases from the previous of waterlogging.

Figure 3-7: Status of money saving

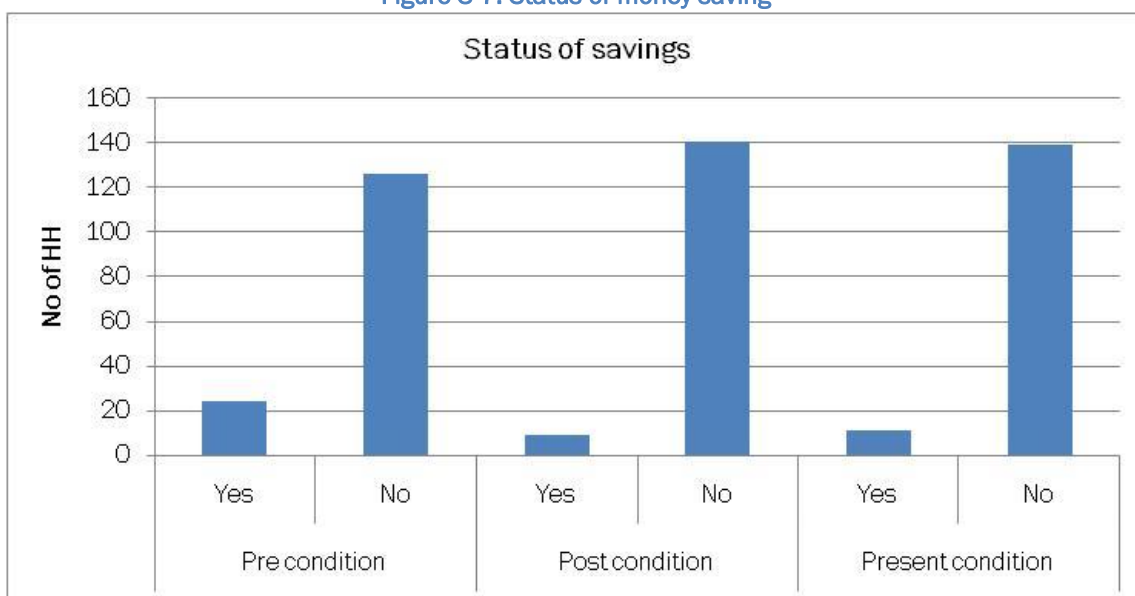
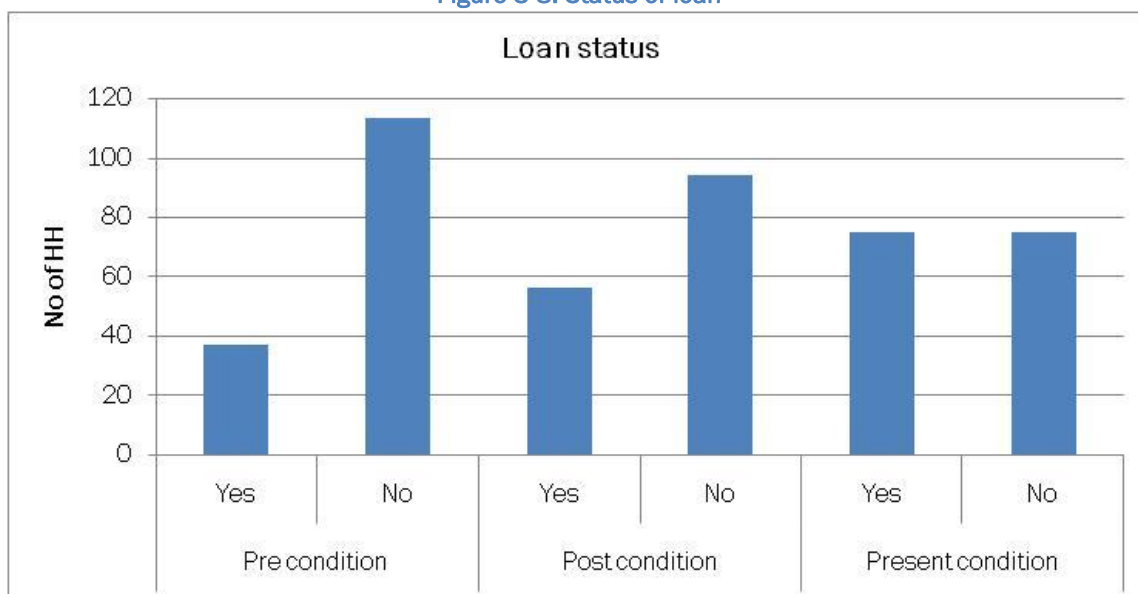


Figure 3-8: Status of loan



This bar chart shows that the lone statuses of tala upazila at Jalalpur union. Cash is the most appropriate form of livelihood support which would have multiple impacts. Risk resilient livelihood skills can also be promoted through cash for training. Many people need also support for livestock feed to prevent distress-selling. According to the present situation those are indicating in the bar chart. People are interested to take loan after waterlogging for the sustainability.

Table 3-16: Effects of water logging on different sector

Sector	Benefit	Demerits	No comments	Remarks
	Frequency	Frequency	Frequency	
Household Income	0	143	7	Household Income seriously decrease due to lack of employment opportunities
Agricultural Production	0	143	7	Agricultural land submerged by water, production decrease, damage crops
Fishing	39	45	66	Fish increases in beel areas, submerge gher farming
Child Education	0	134	16	Lack of communication network, muddy road, lack of security, inundate the school field, use of school as temporary flood shelter
Health	0	130	20	Increase water borne diseases, skin diseases
Livelihood Change	8	68	74	Lac of working opportunities
Migration	0	33	117	Bound to migrate, lack of income
Household Job	11	35	104	Lack of job
Household Condition	61	77	12	Bad condition of HH
Business	13	113	24	Lack of business activities
Sanitation	26	120	4	submerged
Water	72	32	46	quality
Relatives	28	82	40	bound to visit relatives house
Socio Economic	40	72	38	decrease
Others	0	6	146	

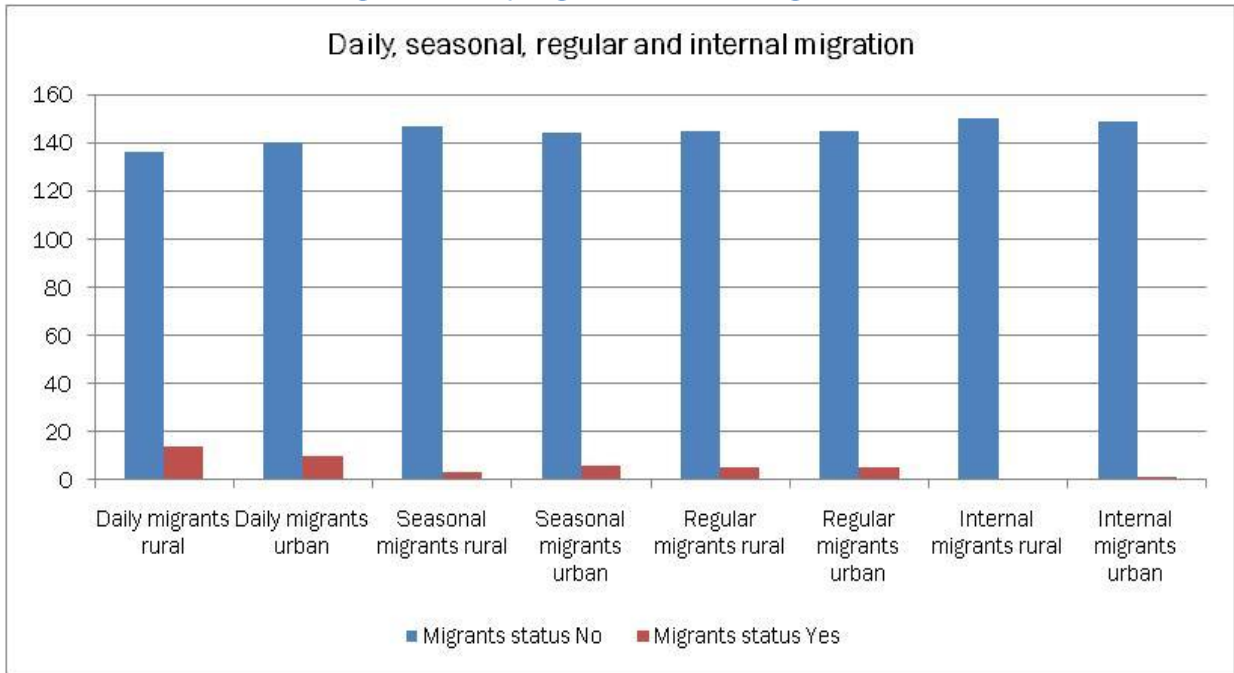
### 3.4.8 Migration status

Table 3-17: Migration Scenario

Migration	Pre condition	Post condition	Present condition
	Frequency	Frequency	Frequency
Total Earning Persons	53	54	67
No of Family	46	47	59
Seasonal migrants	20	27	23
No of Family	20	25	20
Regular migrants	7	11	8
No of Family	6	9	6
Urban to Rural	7	13	15
No of Family	6	10	11
Outgoing Migrants	16	17	18
No of Family	14	14	14
Incomming migrants	37	39	40
No of Family	18	18	18
International migrants	6	0	0
No of Family	1	0	0

Waterlogging resulted into significant migration from the affected areas of Jalalpur union at Tala upzila. Most of them temporarily migrated to Tala upzila at Satkhira district form employment and income. There they are engaging themselves with various secondary economic activities for supporting their family.

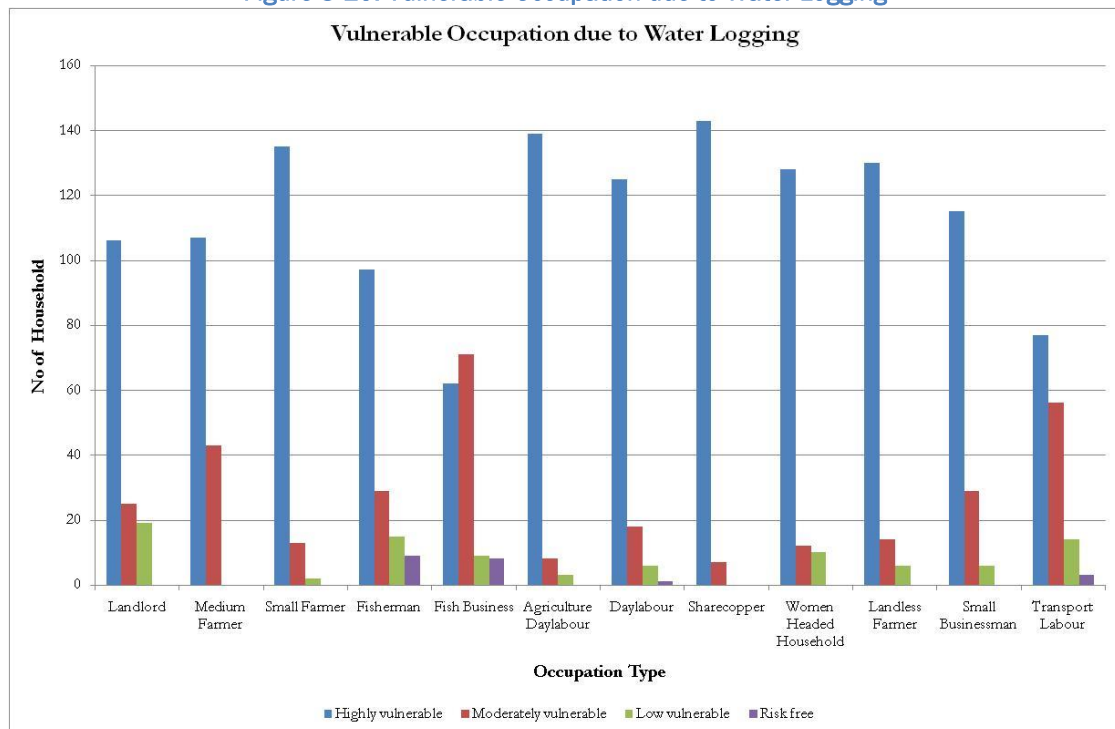
Figure 3-9: Daily, regular and internal migration



### 3.4.9 Vulnerable Occupation

Study found that most vulnerable occupations are sharecropper, agricultural day labor small farmer, land less farmer, women headed house hold, land less farmer, Day labor as waterlogged in Tala for a long period. People on their traditionally depend on above those occupation for their earnings and livelihood. On the other hand people who belong to elite class and rich less affected. The most important findings of this study are income of fishing community; transport worker and businessmen are income increased.

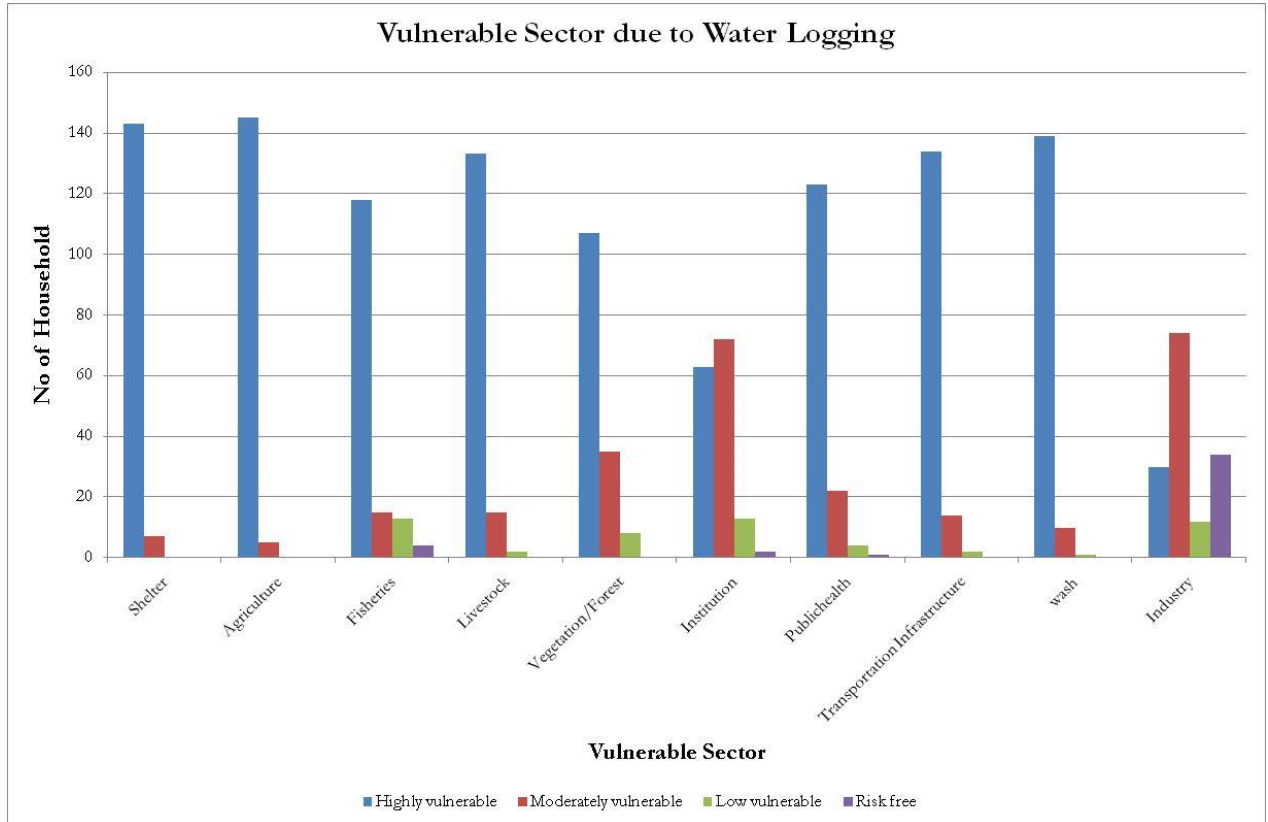
Figure 3-10: Vulnerable Occupation due to Water Logging



### 3.4.10 Vulnerable sector

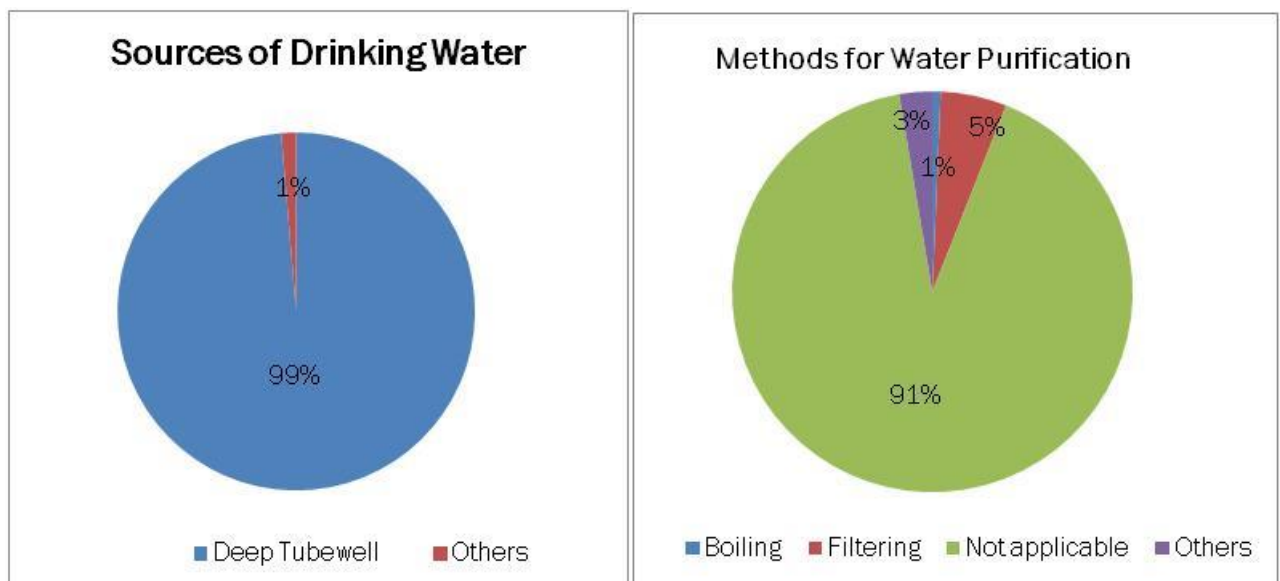
In the study area most vulnerable sectors are respectively agriculture, Shelter, water supply, sanitation, hygiene, public health, livestock and road networks. The less vulnerable sectors are fisheries and industries.

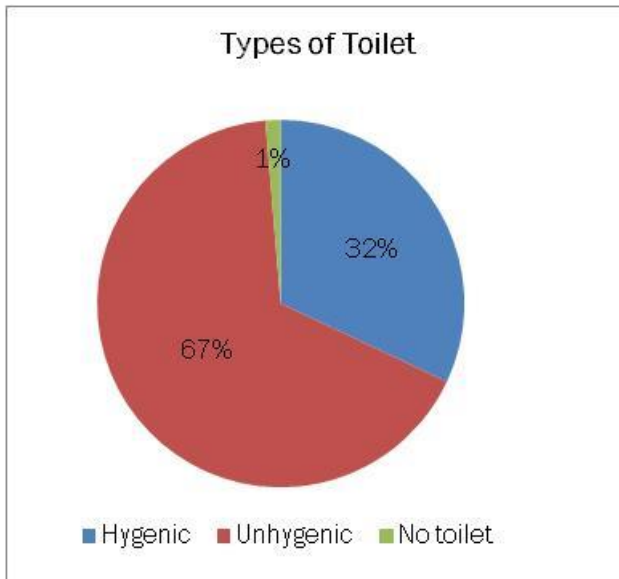
Figure 3-11: Vulnerable sector due to water logging



### 3.4.11 Sources of Drinking Water Methods for Water Purification and types of toilet facilities

Main source of drinking water in the study area is deep and shallow tube well. Most of the people use tube well water for drinking purpose, rest of them use different source of water whose have no access of tube well. Respondents of the field survey said that some of them use pond water for household works and also use drinking purpose. As a result they suffer different kind of food poisoning and diarrhea diseases.





Women, young and adolescent girls and children are the worst affected due to waterlogging. The latrine, tube-well, kitchen, firewood's and other essential items and commodities damaged. Most of the latrines inundate and damage; almost no dry places are there where the community can use as toilet. The women are using banana tree, plastic paper and palm tree made boat for their toilet after sun set, as there is no private dry space, they can't go out to release themselves during day light. This is really inhumanities situation for the victims. Other than some women and children gradually affected by the water-borne diseases like diarrhea, dysentery, scabies and acute respiratory tract infection caused by water for full-time wetting.

#### 3.4.12 Vaccination, Mobile, NID, Family planning, Disability, Attendance of School issues

Inter union, villages' road communication seriously submerged and damaged or washed away by the pressure water. Household or inter community based linking roads are completely damaged. As a result people cannot visit to the health institute for vaccination and family planning issues.

Children pass the in fearful & unsecured life. They cannot go to school due to inundated educational institutions and also cannot go to field for play which is an impact for their mental health. They are facing various problems. Diarrhea, cholera, scabies are affecting to them. They cannot tolerate the pressure of water.

Now a day's most of the household use mobile phone as a modern communication system for exchanging the news between each others. Most of the people have their national ID card. They are interested on family planning issues. Less disable persons are found in the community and school going children rate are gradually increasing.

Table 3-18: Participation in Vaccination, Mobile, NID, Family planning, Disability, School Attendance

	Vaccination	Mobile	NID	Family planning	Disable person	School going children
Yes	134	119	145	99	12	88
No	16	31	5	37	138	29
NA	0	0	0	14	0	33
Total	150	150	150	150	150	150

## CHAPTER FOUR: CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Summary of the Findings

- The study team found that due to the unplanned sluice gate, lack of proper drainage, siltation on river bed and canal, lack of fresh water flow from upstream, unplanned human activities are aggravated the water logging problem day by day.
- Due to loss of agricultural production by water logging severely affecting the livelihood and food security as a whole.
- The overall education rates of the area are decreasing alarmingly due to lack of communication during waterlogged situation. Educational institutes are used as a temporary shelter.
- Emergency health services are worst affected due to absence of medicine and communication network.
- Many community people have the traditional tendency not to leave their own houses and prefer to stay home. Such tendencies are visibly seen in women as they are considered as mostly vulnerable to any disasters.
- Improper design of houses and supply of low quality construction materials also contribute to raise the community conflict.
- The political influencing to Selection of household /beneficiaries to distribute the relief goods are increased the disparities among the community.
- Overlapping of resource from the different agencies also aggravate the existing situation.
- Lack of inter agencies coordination also play a significant role to recover from the adversaries of water logging.
- Seasonal migration is increasing due to water logging.

### 4.2 Conclusions

Climate change has been exacerbating the water-logging condition due to the reduced dry season flow which increases the sedimentation and heavy rainfall at monsoon augmenting the water-logging problem in the Jessore, Satkhira and Khulna district from the last two decades. Sea level rise (SLR) increases the backwater effect which slowing down the peak discharge and salinity intrusion amplify the riverbed siltation which aggravates water-logging problem at the Kopotaksho Basin Area. There were a number of waterborne disease affected people in the water-logged area due to scarcity of safe drinking water supply and sanitation. Most were affected by diarrhea, cholera, dysentery, cold, fever, pneumonia, scabies, skin diseases and malnutrition which ultimately deteriorate the health condition of the people of water-logged area. Affected people are suffering with lack of food and pure drinking water as water-logging is hampering agriculture and other income generating activities.

### 4.3 Recommendations

- Re Execution of Kopotakhi river and canals;
- Proper earth spoil management during the excavation or dredging the river;
- Improve the existing transportation network and communication systems;
- Capacity building of Health institutions;
- Promote new variety of water tolerant crops and cropping pattern;
- Create alternative livelihood opportunities such as : duck rearing, floating agriculture, mushroom cultivation, cage fish culture, training on craft, tailoring, poultry and fish feed firming etc;
- Establishment of new small and medium industries for income generation;
- Reconstruct temporary shelter/flood shelter for multipurpose use;
- The relief programme should be run through ensuring equity and in a well coordinated way until the affected people can recover their damage;

- Encourage the community for social forestry and tree plantation programme for environmental sustainability;
- Damaged embankments and communication system should be repaired, and where necessary reconstructed, as priority basis to protect the affected area
- Disaster preparedness programme should focus awareness and capacity building of the local people to increase their adaptive capacity in facing different natural calamities.

#### 4.4 Reference

- Alam, 2007. *Knowledge and capacity for governance: the negotiated approach*, discussion draft paper, Netherlands.
- Alam M.K., Hasan A.K.M.S., Khan M.R., and Whitney J.W., 1990. Geological Map of Bangladesh, Govt. of the People's Republic of Bangladesh, Geological Survey of Bangladesh.
- Ashraf-ul-Alam, 2005. *River management in Bangladesh: a people's initiative to solve water-logging*, Coastal Development Partnership (CDP), Khulna, Bangladesh.
- Ashroy Foundation, 2013. Situation Report on "South-Western Coastal Districts Water Logging Situation Satkhira & Jessore, Khulna Districts" Khulna, Bangladesh.
- BBS, 2012. Population and Housing Census 2011, Community Report (Satkhira Zila), Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka
- Chowdhury, R.K., 2007. *Climate Change Impact and Disaster Vulnerabilities in the Coastal Areas of Bangladesh*, Dhaka.
- Daily Star, 2006. *Marooned in cruel waters - 37 Polders Vast swath of land in 3 districts becomes waterlogged as river beds get silted up*, August 09, Dhaka.
- Egglesman R., 1982. Peatland polders of North-west Germany polders of the world, vol.-1, papers of international symposium, Oct., 1982. The Netherlands, pp. 48-57. 1994.
- FAO, UNDP, 1988. Land Resources Appraisal of Bangladesh for Agricultural Development, BGD/81/035 Technical report 2 Agro ecological regions of Bangladesh (Pp 239-258).
- Pasha K.Z.K., 2009. *Scarcity of drinking water; in perspective of Southwest Coastal region of Bangladesh*, Initiative for Right View (IRV), Khulna, Bangladesh.
- Rahman, A. 2008. *Land Cover and Environmental Hazards; Satellite Remote Sensing Approach and Solutions in Bangladesh*. Austria. 9-12 September.
- Reshad M.E.A., and Ahmed M., 2001. Effects of poldering on the morphodynamic characterization in the Khulna-Jessore area of Bangladesh- A case study. Govt. of the people's republic of Bangladesh. Geological survey of Bangladesh (unpublished report), Dhaka.
- Unnayan Onneshan, 2007. *The Development Disaster Water logging in the Southwest region of Bangladesh*. Dhanmondi, Dhaka - 1209, Bangladesh.
- WFP, FAO and Shushilan, 2011. *A Rapid Food Security Assessment in Satkhira in the Context of Recent Floods and Water Logging*, Dhaka, Bangladesh.